Richmond Refinery LPS Bulletin – Reliability

Bed V-2072 Overhead Valve PV505B Packing Failure

IPS Control: 1739459

Location: Hydro,
South Isomax, PSA Unit

Contact Information:
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Reference Photos:

Holes in worn PV505B valve packing

Compressed Enviroseal packing

IIF – Recognize Risk

Incident Description:

On Sunday 11/30/2009 at 8:30am, an operator at the Hydrogen Recovery Unit observed a packing leak from the overhead valve (PV505B) of the Pressure Swing Adsorber (PSA) Bed V-2072. Maintenance was notified immediately and a mechanic was sent to tighten up the PV505B packing gland. The leak was reduced but could not be stopped.

Further attempts were made to stop the leak on Monday and Tuesday, however, the leak at PV505B worsened. This prompted Operations to shut down the PSA Unit to prevent danger to personnel and damage to equipment, and to isolate and replace the leaking valve.

The associated costs of this failure were relatively minor, and although the plant was down only 13 hours for the valve replacement, the delayed repair was counted as a reliability clock reset against the PSA Unit.

Investigation Findings:

1. Analysts most familiar with the Valtek bed sequencing valves were not consulted during the holiday weekend about the low-maintenance nature of SureGuard packing, which consists of perfluoroelastomer (PFE) sealing rings and carbon-filled teflon (PTFE) packing rings.
2. The leaking valve was carefully disassembled to confirm it was within all OEM specifications and had the correct packing. However, the packing was worn through and the stem was slightly worn.
3. This style of valve and actuator is designed to operate for 500,000 strokes. The PV505B was last serviced in March 2006 when all 25 valves at the PSA Unit were serviced. This corresponds to 43 months or about 1,500,000 strokes when the PV505B packing leaked.
4. These 25 bed sequencing valves were not serviced in the June 2009 TKC turnaround in anticipation of decommissioning the plant due to the Energy and Hydrogen Renewal Project. This plan was suspended in July 2009, only a month after the logical maintenance window would have occurred.

Lessons Learned:

Employees that work around and operate control valves with inherently or externally live-loaded low-emission packing should be aware of special procedures and considerations for making successful packing adjustments.

Recommendations:

1. Install warning tags on PSA valves to contact analysts prior to performing maintenance and follow special procedures for these types of valve packing.
2. Keep at least one full set of 5 valves in inventory to minimize downtime and the cost of similar future failures.
3. Adjust replacement frequency of PSA bed sequencing valves based on expected reliability and failure rates.

Tenets of Operations Violated:

#1 Always operate within design or environmental limits.
#10 Always involve the right people on decisions that affect equipment.